



Testimony

Before the Subcommittee on Cyber,
Innovative Technologies, and Information
Systems, Committee on Armed Services,
House of Representatives

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ELECTROMAGNETIC SPECTRUM OPERATIONS

DOD Needs to Take Action to Help Ensure Superiority

Statement of Joseph W. Kirschbaum, PhD, Director,
Defense Capabilities and Management

Accessible Version

GAO Highlights

Highlights of [GAO-21-440T](#), a testimony before the Subcommittee on Cyber, Innovative Technologies, and Information Systems, Committee on Armed Services, House of Representative

Why GAO Did This Study

The spectrum is essential for facilitating control in operational environments and affects operations in the air, land, sea, space, and cyberspace domains. Spectrum use is pervasive across warfighting domains and thus maintaining or achieving spectrum superiority against an adversary is critical to battlefield success.

This statement summarizes: (1) the importance of the spectrum; (2) challenges to DOD's superiority in the spectrum; and (3) the extent to which DOD has implemented spectrum-related strategies and is positioned to achieve future goals.

This statement is based on GAO's December 2020 report ([GAO-21-64](#)) and updates conducted in March 2021. For the report, GAO analyzed 43 studies identified through a literature review, reviewed DOD documentation, and interviewed DOD officials and subject matter experts. For the updates, GAO reviewed materials that DOD provided in March 2021.

What GAO Recommends

In its December 2020 report, GAO made five recommendations, including that DOD should identify processes and procedures, reform governance structures, assign leadership for strategy implementation, issue an implementation plan, and develop oversight processes. DOD generally concurred with the recommendations, and as of early March 2021 has an implementation plan being reviewed by senior leaders.

View [GAO-21-440T](#). For more information, contact Joseph W. Kirschbaum at (202) 512-9971 or kirschbaumj@gao.gov.

March 2021

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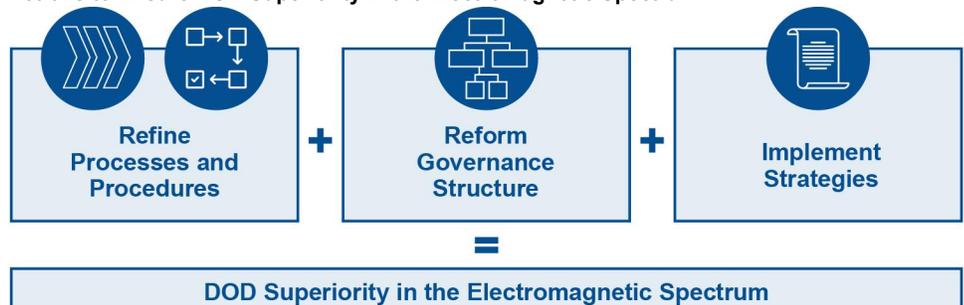
What GAO Found

The electromagnetic spectrum (the spectrum) consists of frequencies worldwide that support many civilian and military uses, from mobile phone networks and radios to navigation and weapons. This invisible battlespace is essential to Department of Defense (DOD) operations in all domains—air, land, sea, space, and cyberspace. The interruption of U.S. forces' access to the spectrum can result in a military disadvantage, preventing U.S. forces from operating as planned and desired.

According to the studies by DOD and others that GAO reviewed for its December 2020 report on military operations in the spectrum, adversaries, such as China and Russia, are also aware of the importance of the spectrum and have taken significant steps to improve their own capabilities that challenge DOD and its operations. For example, studies described how China has formed new military units and fielded new unmanned aerial vehicles with spectrum warfare capabilities, and Russian electromagnetic warfare forces have demonstrated their effectiveness through successful real-world applications against U.S. and foreign militaries. These developments are particularly concerning in the context of challenges to DOD's spectrum superiority. GAO's analysis of the studies highlighted DOD management challenges such as dispersed governance, limited full-time senior-level leadership, outdated capabilities, a lengthy acquisition process, increased spectrum competition and congestion, and a gap in experienced staff and realistic training.

GAO found that DOD had issued strategies in 2013 and 2017 to address spectrum-related challenges, but did not fully implement either strategy because DOD did not assign senior leaders with appropriate authorities and resources or establish oversight processes for implementation. DOD published a new strategy in October 2020, but GAO found in December 2020 the department risks not achieving the new strategy's goals because it had not taken key actions—such as identifying processes and procedures to integrate spectrum operations across the department, reforming governance structures, and clearly assigning leadership for strategy implementation. Also, it had not developed oversight processes, such as an implementation plan, that would help ensure accountability and implementation of the 2020 strategy goals (see figure).

Actions to Ensure DOD Superiority in the Electromagnetic Spectrum



Source: GAO analysis of Department of Defense (DOD) information. | [GAO-21-440T](#)

Chairman Langevin, Ranking Member Stefanik, and Members of the Subcommittee:

I am pleased to be here today to discuss the vital role of the electromagnetic spectrum (the spectrum) in the Department of Defense's (DOD) military operations. The spectrum is the range of all frequencies of electromagnetic radiation that are subdivided into frequency bands. A wide variety of technologies use these frequency bands to operate. From using GPS and listening to streaming, satellite, FM, or AM radio stations in our cars to the military's infrared goggles illuminating soldiers' views of the battlefield, we depend on the spectrum. For this reason, control of this invisible battlespace is essential in ensuring our national security.

We are not the only global power to recognize the importance of spectrum superiority. Potential adversaries, including Russia and China, have made great strides in improving their electromagnetic warfare capabilities and use of the spectrum in general. While DOD has recognized this problem and has taken some steps that may help address this issue, the United States can no longer be assured of superiority in the spectrum.

DOD has published several strategies related to the spectrum, but the department has faced challenges in fully implementing them.¹ For example, DOD Chief Information Officer officials stated that officials involved in implementing the 2013 strategy could not compel action from other DOD organizations and received only temporary resources. DOD released the 2020 Electromagnetic Spectrum Superiority Strategy in October 2020 to try to unify the department's approach to ensuring control of the spectrum.² It is important for DOD to be well positioned to implement its 2020 strategy so that the United States will be able to effectively counter our potential adversaries' increasing capabilities in electromagnetic warfare. DOD's efforts are critical to ensuring the national security for our country and for our allies.

¹Department of Defense, *Department of Defense Electromagnetic Spectrum Strategy 2013: A Call to Action*; Department of Defense, *The DOD Electronic Warfare Strategy* (2017) (FOUO).

²Department of Defense, *Department of Defense Electromagnetic Spectrum Superiority Strategy* (October 2020).

My testimony today provides information on (1) the criticality of the spectrum to military operations, (2) adversarial advances in spectrum capabilities compared to previously identified DOD spectrum challenges; and (3) the extent to which DOD is positioned to ensure spectrum superiority.

This statement is based on the report we issued in December 2020.³ To conduct that work, we performed a literature search and identified 43 unclassified, independent studies.⁴ We also assessed DOD strategies, policies, and other documents, and interviewed DOD officials. In addition, we obtained updates in March 2021. Specifically, we reviewed written information from DOD about relevant actions it had taken and planned to take. Our December 2020 report provides more details on the scope and methodologies we used to carry out our work.

We conducted the work on which this statement is based in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions, based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

DOD Uses the Spectrum for Military Applications in All Domains

DOD is dependent upon the electromagnetic spectrum across all warfighting domains—air, land, sea, space and cyberspace (see figure 1). Gaining and maintaining control within the spectrum allows DOD freedom of maneuver and action and the ability to achieve tactical, operational, and strategic advantage. However, U.S. forces compete with adversaries

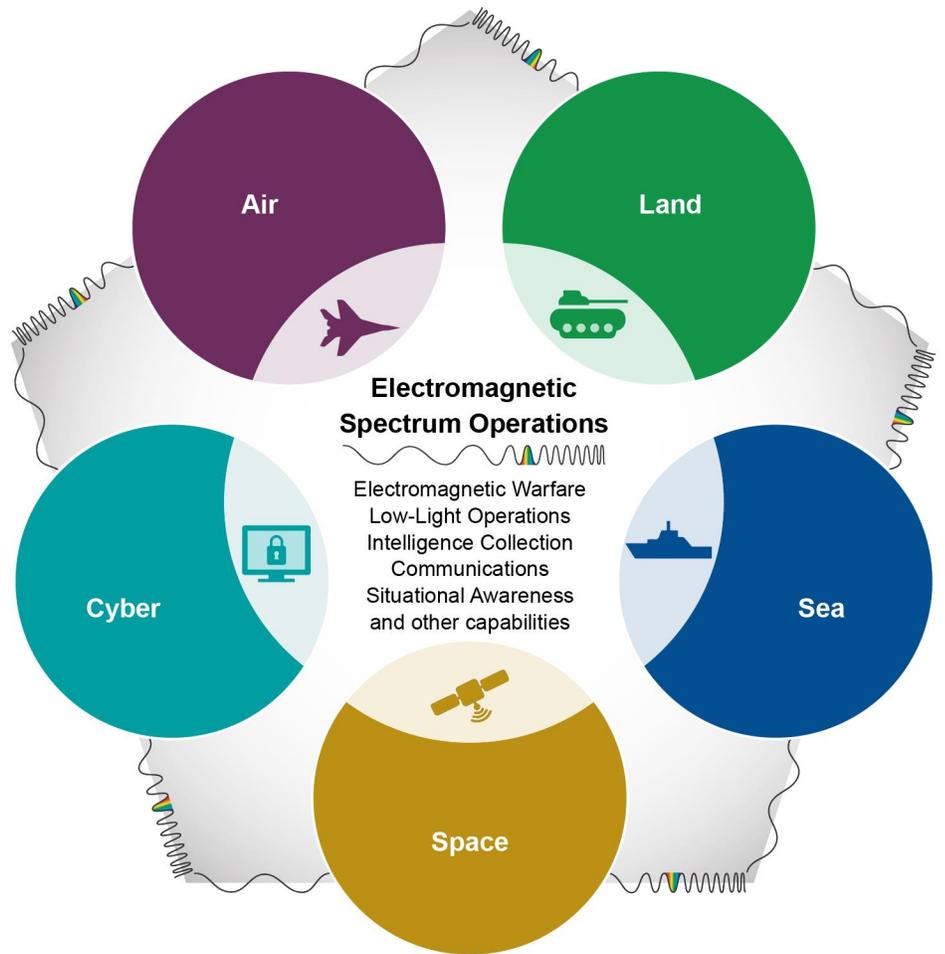
³GAO, *Electromagnetic Spectrum Operations: DOD Needs to Address Governance and Oversight Issues to Help Ensure Superiority*, [GAO-21-64](#) (Washington, D.C.: Dec. 10, 2020).

⁴These 43 assessments, reviews, and studies were published from January 2010 through April 2020 and issued by DOD, performed on behalf of DOD by organizations such as RAND and the Institute for Defense Analyses, and independent organizations including our prior reports and Congressional Research Service reports. We did not analyze classified information because of the effects on government operations related to the coronavirus disease 2019 (COVID-19). We interviewed DOD subject matter experts to verify that classified information would not change our findings and conclusions.

as well as neutral parties for access and control. The interruption of U.S. forces' access to the spectrum can result in a military disadvantage, preventing U.S. forces from operating as planned and desired.

The U.S. military's use of the spectrum can identify threats and provide joint forces with information in real time. For example, signals intelligence, information operations, and command and control functions that link communications between U.S. military forces rely on the electromagnetic spectrum. Access to the spectrum also allows troops to identify friendly and adversarial forces, access targeting support, and implement self-protection countermeasures.

Figure 1: DOD's Use of the Electromagnetic Spectrum across Warfighting Domains

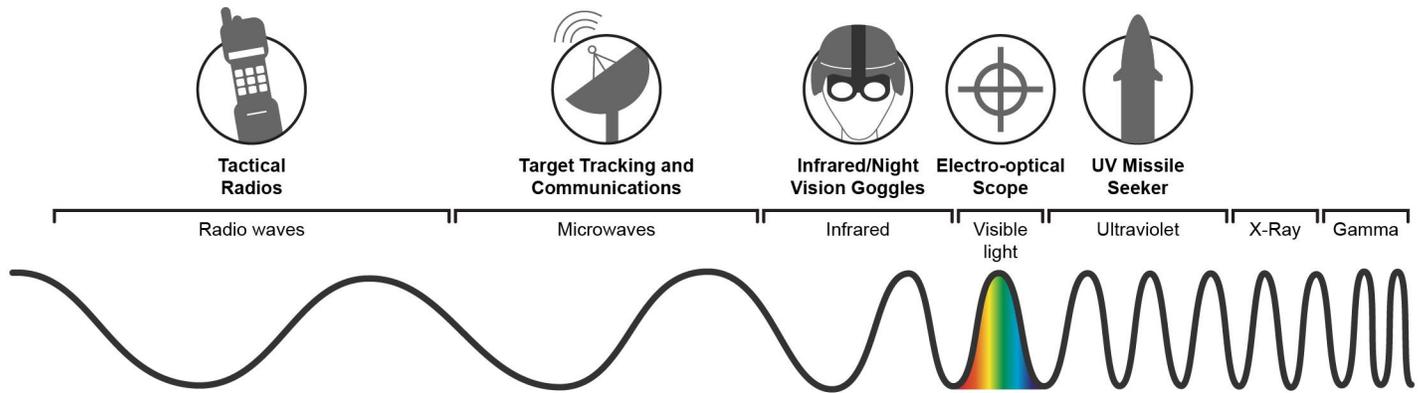


The joint force depends on the electromagnetic spectrum for operations in all domains.

Source: GAO analysis of Department of Defense (DOD) information. | GAO-21-440T

At a more tactical level, DOD uses the spectrum to support a range of applications such as tactical radios, target tracking, and night-vision goggles, among other uses (see figure 2).

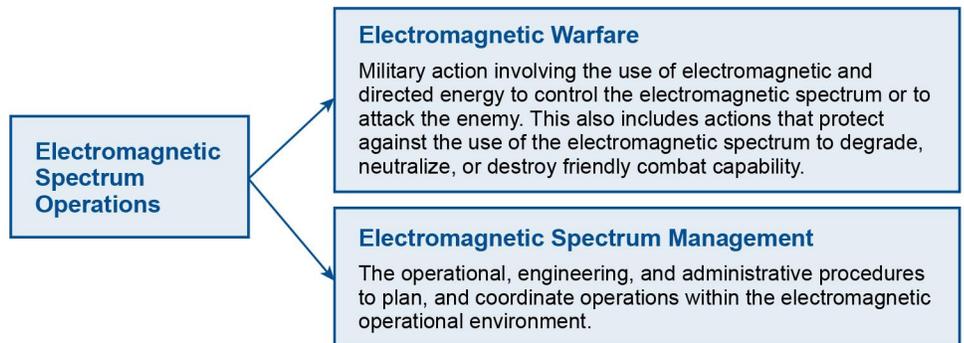
Figure 2: The Electromagnetic Spectrum and Department of Defense Applications



Source: GAO analysis based on Department of Defense information. | GAO-21-440T

DOD defines electromagnetic spectrum operations as coordinated military actions to exploit, attack, protect, and manage the electromagnetic environment.⁵ As shown in figure 3, these operations include electromagnetic warfare (i.e., the use of electromagnetic and directed energy to control the electromagnetic spectrum or to attack adversaries) and electromagnetic spectrum management.

Figure 3: Electromagnetic Spectrum Operations Are Composed of Two Coordinated Efforts



Source: GAO analysis of Department of Defense information. | GAO-21-440T

⁵Chairman of the Joint Chiefs of Staff, *Joint Publication 3-85: Joint Electromagnetic Spectrum Operations* (May 22, 2020).

Text of Figure 3: Electromagnetic Spectrum Operations Are Composed of Two Coordinated Efforts

1) Electromagnetic Spectrum Operations

a) Electromagnetic Warfare

Military action involving the use of electromagnetic and directed energy to control the electromagnetic spectrum or to attack the enemy. This also includes actions that protect against the use of the electromagnetic spectrum to degrade, neutralize, or destroy friendly combat capability.

b) Electromagnetic Spectrum Management

The operational, engineering, and administrative procedures to plan, and coordinate operations within the electromagnetic operational environment.

Threats and Challenges to Spectrum Superiority Jeopardize DOD Operations

Adversaries Have Incorporated Spectrum Dominance as a Key Enabler against the United States

The summary of 2018 National Defense Strategy identified the reemergence of long-term, strategic competition and described the ways in which China and Russia seek to shape the world.⁶ DOD reported in 2019 that while the United States focused on counter-terrorism, China and Russia were working to advance their spectrum-related capabilities.⁷

- **China** has formed new military units to achieve dominance in the spectrum and centralized space, cyber, electromagnetic warfare capabilities, and potentially psychological warfare, according to

⁶Department of Defense, *Summary of the 2018 National Defense Strategy of the United States of America: Sharpening the American Military's Competitive Edge* (Jan. 19, 2018).

⁷Department of Defense, *Report on FY 2019 NDAA Section 1053, Guidance on the Electronic Warfare Mission Area and Joint Electromagnetic Spectrum Operations*, (Sept. 30, 2019).

studies we reviewed for our December 2020 report.⁸ A 2019 DOD report to Congress also stated that China has fielded several types of unmanned aerial vehicles with electromagnetic warfare systems.⁹ China has also begun to practice, evaluate, and improve the use of spectrum-related capabilities in training events where units jam or confuse communications, sensors, and satellite navigation systems.¹⁰

- **Russia** has been working to realize its spectrum goals. The Defense Intelligence Agency in 2019 described Russia’s electromagnetic warfare forces as “world-class,” and stated that Russia was capable of destroying others’ command, control, communications, and intelligence capabilities.¹¹ Russia’s electromagnetic warfare systems are highly mobile, making it more difficult for others to combat. Since 2014, Russia has also taken advantage of military operations in Ukraine and Syria to gain practical experience in electromagnetic warfare and has developed counter-space warfare capabilities.¹² For example, 2019 research suggests that Russia may be developing next generation nuclear reactors that could interfere with electronic signals in space.

In February 2021, we reported on the possibility of China and Russia using spectrum capabilities to disrupt communication and navigation systems on ships that DOD relies on to rapidly move equipment and

⁸RAND Corporation, *Systems Confrontation and System Destruction Warfare: How the Chinese People’s Liberation Army Seeks to Wage Modern Warfare* (Santa Monica, CA: 2018). Costello, John and Joe McReynolds. Center for the Study of Chinese Military Affairs, Institute for National Strategic Studies, National Defense University. *China’s Strategic Support Force: A Force for a New Era*. (Washington, D.C.: 2018).

⁹Department of Defense, Office of the Secretary of Defense, *Annual Report to Congress: Military and Security Developments Involving the People’s Republic of China 2019* (May 2, 2019).

¹⁰Clark, Bryan, Whitney Morgan McNamara, and Timothy A. Walton. Center for Strategic and Budgetary Assessments. *Winning the Invisible War: Gaining an Enduring U.S. Advantage in the Electromagnetic Spectrum*. (Washington, D.C.: 2019).

¹¹Department of Defense, Defense Intelligence Agency, *Russian Military Power: Building a Military to Support Great Power Aspirations*, DIA-11-1704-161 (2017).

¹²Center for Strategic and Budgetary Assessments, *Recognizing the Electromagnetic Spectrum as an Operational Domain* (Dec. 22, 2017). Center for Strategic and International Studies, The Aerospace Security Project, *Space Threat Assessment 2020* (Washington, D.C.: March 2020).

personnel.¹³ Specifically, we reported that the aging ships DOD uses for sealift do not have the defensive capabilities that might be needed in environments where China or Russia are also operating. For example, these ships could be susceptible to GPS spoofing, where manipulated signals deceive a GPS receiver.

Studies by DOD and Other Organizations Have Identified Multiple Challenges to Ensuring DOD's Spectrum Superiority

Our adversaries' developments are particularly concerning in the context of challenges within the department that many studies have identified about DOD's spectrum superiority. We found in December 2020 that nearly three-quarters of the 43 studies we analyzed described challenges, such as outdated capabilities, a lengthy acquisition process, increased spectrum competition and congestion, and gaps in experienced staff and realistic training.¹⁴ Some spectrum technologies that DOD employs are outdated and have not functionally changed in design since they were fielded decades ago. Studies stated that, combined with DOD's slow and disjointed acquisition process, these dated technologies make it more difficult for DOD to field new and innovative technology, while our adversaries are developing satellite communication jammers and space-based lasers.

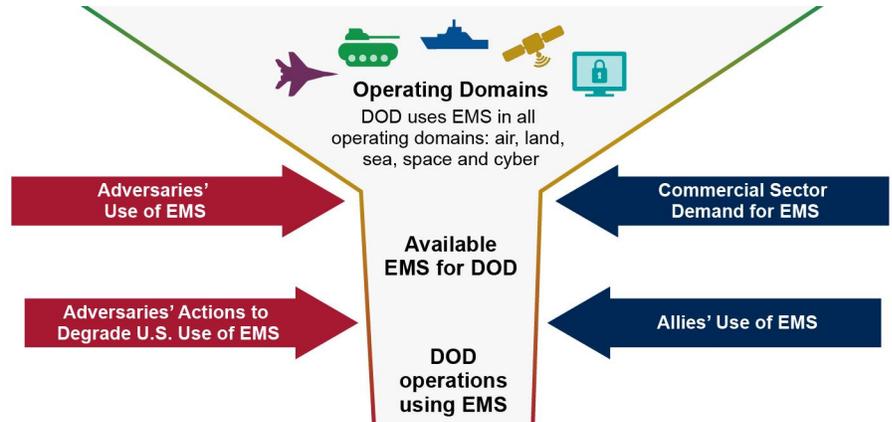
Another challenge that studies identified relates to spectrum competition and congestion. As more users use the spectrum—such as commercial entities, allies, and adversaries—military operations in the spectrum have become increasingly congested and contested (see figure 4). This crowding of the spectrum can lead to unintentional interference.¹⁵ DOD officials have expressed concern that spectrum auctions and reallocations have limited the amount of spectrum available for military operations.

¹³GAO, *Defense Transportation: DOD Can Better Leverage Existing Contested Mobility Studies and Improve Training*, [GAO-21-125](#) (Washington, D.C.: Feb. 26, 2021).

¹⁴See [GAO-21-64](#) for a complete list of studies reviewed, including the studies that identify spectrum-related challenges, and the recommendations within those studies to address ongoing spectrum-related challenges.

¹⁵Department of Defense, Office of the Chief Information Officer, *Information Paper: Expanded Office of the Secretary of Defense Level Responsibilities Necessary for the Full Range of Electromagnetic Spectrum (EMS) Activities within the Department of Defense*. (Jan. 20, 2020).

Figure 4: Increased Competition for Electromagnetic Spectrum (EMS) Decreases Availability for DOD Use



Source: GAO analysis of Department of Defense (DOD) information and non-DOD information. | GAO-21-440T

According to DOD officials, DOD had not prioritized spectrum operations over the past few decades. The result is that institutional knowledge of electromagnetic warfare and associated needs has deteriorated in the department. Compounding this issue, DOD has experienced challenges in training troops to operate in the kind of degraded electromagnetic environment that it might face in real-world operations. DOD has made some improvements, but troops generally are not training in realistic conditions.

DOD Has Not Fully Implemented Prior Strategies for the Spectrum and Is at Risk of Not Achieving Long-Term Goals

DOD Did Not Fully Implement Its 2013 and 2017 Strategies

DOD issued two department-wide spectrum-related strategies in 2013 and 2017,¹⁶ and published a third strategy in October 2020.¹⁷ DOD’s stated intention for its 2020 strategy is to bring together and expand the

¹⁶DOD refers to the two strategies as the 2013 DOD Electromagnetic Spectrum Strategy and the 2017 Electronic Warfare Strategy.

¹⁷Department of Defense, *Department of Defense Electromagnetic Spectrum Superiority Strategy* (October 2020).

2013 and 2017 strategies. The previous strategies presented several courses of action for DOD to adapt to the changing, congested, and contested spectrum environment, and to develop capabilities in this area. The 2020 strategy seeks to build on its predecessors as well as position the department to look at the spectrum holistically, lay the foundation for a robust spectrum enterprise, prepare professionals to leverage new technologies, and focus on strengthening alliances.

Our December 2020 report found that DOD had not fully implemented the 2013 and 2017 strategies, which we determined to be associated with bureaucratic and organizational hindrances within DOD. Specifically, DOD had not taken key actions to revise governance and oversight. For example, DOD officials told us they thought the 2013 strategy was successful at driving culture change and the way the department thought about the spectrum, but not all components called upon to implement the strategy's tasks did so. Specifically, as of January 2019 (i.e., more than 5 years after the 2013 strategy was issued), three of 23 recommendations based on the strategy had been completed. For example, DOD assessed that it had made limited progress in writing new policy for spectrum sharing (due in 2016), and had not completed evaluating mission impacts related to spectrum access (due in 2017).

DOD also had limited success implementing the 2017 strategy. This strategy aimed to organize, train, and equip forces to be offensively focused, ready to gain and ensure spectrum superiority, and unified in effort. For example, in response to the strategy calling for an electromagnetic warfare workforce, each service established officer and enlisted communities that include such expertise. But these efforts generally placed these groups within broader communities or with cyber communities, and did not result in the intended emphasis on electromagnetic warfare. DOD officials agreed that this represented limited progress in implementing the 2017 strategy.

DOD Must Take Key Action to Ensure That the 2020 Strategy Is Implemented and Goals Are Achieved

Our December 2020 report also found that DOD had not completed congressionally mandated actions, nor had it addressed factors that contributed to the previous strategies' stalled implementation, and that this threatened the potential success of the 2020 strategy. Specifically, we found that the department had not issued processes and procedures, proposed and implemented governance reforms, assigned a senior

official to oversee implementation of the strategy, and identified oversight activities. We made five recommendations to address these issues and DOD generally concurred with these recommendations. Each issue is discussed in more detail below.

Issue processes and procedures to integrate spectrum operations across DOD. In the John S. McCain National Defense Authorization Act for Fiscal Year 2019, Congress required the Secretary of Defense to take specific actions related to processes and procedures for the spectrum.¹⁸ Our analysis found that DOD had taken some steps, such as issuing guidance, but these did not cover all process and procedure elements required by the statute.

DOD has been submitting reports to Congress on its progress in meeting the statutory requirements, but we found that the reports did not address the required processes and procedures. DOD agreed with our recommendation that the department should issue the required processes and procedures, and stated that it would take action via an implementation plan for the 2020 strategy. As of early March 2021, DOD officials told us that senior DOD officials were reviewing the draft implementation plan but said they did not have a timeframe for when the department would publish the plan.

Propose and implement governance reforms. Multiple studies that we reviewed identified governance as a major challenge for DOD spectrum operations, including dispersed governance across the department and full-time responsibilities being located at lower organizational levels. For example, DOD officials said there is no central coordinating authority for the multiple offices with spectrum duties. The Institute for Defense Analyses reported that having so many offices with spectrum duties

¹⁸The specific statutory requirements were to 1) establish processes and procedures to develop, integrate, and enhance the electromagnetic warfare mission area and the conduct of joint spectrum operations in all domains across the department; and 2) ensure that such processes and procedures provide for integrated defense-wide strategy, planning, and budgeting with respect to the conduct of such operations, including activities conducted to counter and deter such operations by malign actors. See Pub. L. No. 115-232, § 1053(a)(1-2) (2018).

means in practice, nobody is accountable for addressing the spectrum as a whole and the Secretary has nowhere to turn for decisive action.¹⁹

Congress similarly shared this concern about governance and mandated that the Secretary of Defense designate a senior official to help address this problem by proposing governance and management reforms.²⁰ The Secretary established a cross-functional team consistent with this statutory requirement and another section of the act.²¹ However, DOD's progress reports from 2019 through 2020 acknowledged that governance issues persisted and continued to put DOD's spectrum operations at risk. Our work found DOD did not address reforms needed to resolve this problem. For example, the 2020 status report to Congress stated that the DOD Chief Information Officer has sufficient authorities to serve as DOD's lead for spectrum issues. However, the same report stated that the cross-functional team believed the current Chief Information Officer structure limits its influence to advance spectrum issues within the department.²²

A cross-functional team official told us during our review these governance reforms will come about as part of the new 2020 strategy. While the 2020 strategy identifies effective spectrum governance as a goal, a strategic goal is not the same as specific proposals for reform. DOD agreed with our December 2020 recommendation that the Vice Chairman of the Joint Chiefs of Staff, as the Senior Designated Official of the cross-functional team, should propose these reforms. In mid-March 2021, DOD stated that the implementation plan for the 2020 strategy would address this recommendation by including spectrum governance reforms.

Assign a senior official with appropriate authority to oversee long-term strategy implementation. We found that DOD had not taken another key governance action—assigning a senior official with appropriate authority and resources to ensure that the new 2020 strategy

¹⁹Institute for Defense Analyses, *Independent Assessment of EMS Enterprise Organizational Alternatives*, (Alexandria, VA.: 2019), 4.

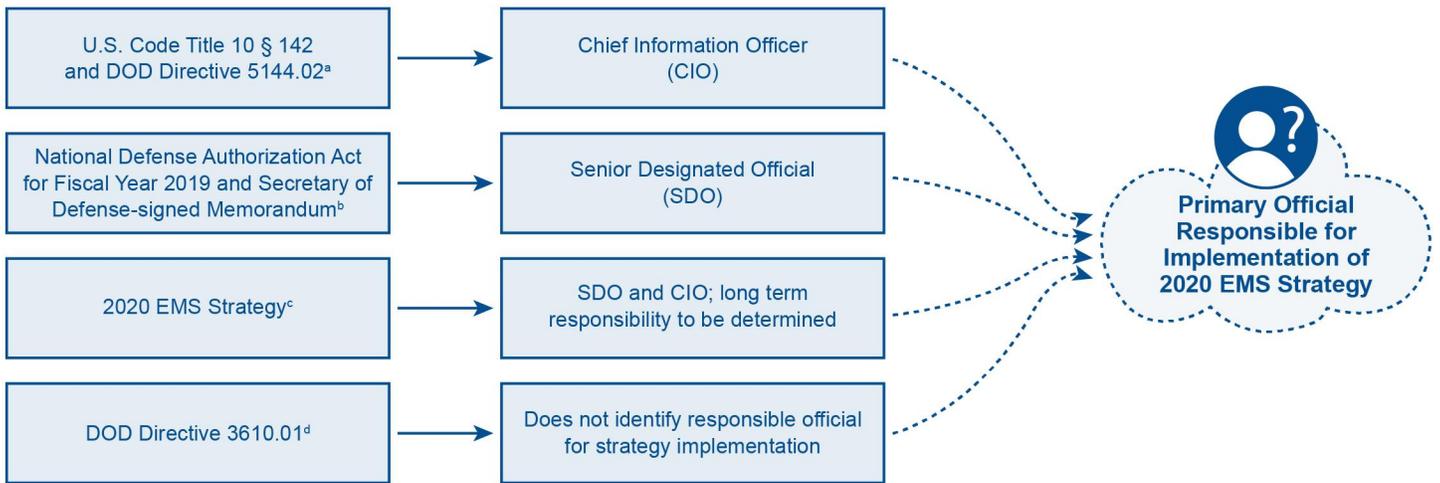
²⁰Pub. L. No. 115-232, § 1053(b)(2)(C) (2018).

²¹Pub. L. No. 115-232, §§ 918 and 1053(c) (2018).

²²Department of Defense, *Second Report on Section 1053(d)(4) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019, Guidance on the Electronic Warfare Mission Area and Joint Electromagnetic Spectrum Operations*. (July 2020).

is implemented long-term. According to DOD, the lack of an official with appropriate authority likely limited the success of the previous 2013 and 2017 strategies. Implementation of the 2020 strategy is due to begin April 1, 2021, 180 days after the 2020 strategy was issued. As shown in figure 5 below, we found that the lack of clarity across DOD guidance and federal law about which official is primarily responsible for long-term implementation contrasts with the 2020 strategy's long-term vision for superiority in the spectrum.²³ In particular, four different DOD documents assign responsibilities related to the spectrum. They are not consistent about which official has the authority and resources to organize efforts across DOD components and to ensure they implement the department's strategy and goals.

Figure 5: Federal Laws and Department of Defense Documents Related to Electromagnetic Spectrum (EMS) Strategy Implementation



Source: GAO analysis of Department of Defense (DOD) information. | GAO-21-440T

²³The long-term vision in the 2020 strategy aims for forces in 2030 and beyond to be ready to fight and win through the deliberate, institutional pursuit of spectrum superiority. *Department of Defense Electromagnetic Spectrum Superiority Strategy.*

Data table for Figure 5: Federal Laws and Department of Defense Documents Related to Electromagnetic Spectrum (EMS) Strategy Implementation

Federal Law/Defense Dept Documents	Primary official responsible for implementation of 2020 EMS Strategy
U.S. Code Title 10 § 142 and DOD Directive 5144.02 /a/	Chief Information Officer
National Defense Authorization Act for Fiscal Year 2019 and Secretary of Defense-signed Memorandum //	Senior Designated Official (SDO)
2020 EMS Strategy /c/	SDO and CIO; long term responsibility to be determined
DOD Directive 3610.01 /d/	Does not identify responsible official for strategy implementation

Source: GAO analysis of Department of Defense (DOD) information. | GAO-21-440T

^aCIO officials told us that they believe their statutory and department-assigned responsibilities will make the CIO responsible for overseeing strategy implementation.

^bThese documents assign responsibility to the SDO (Vice Chairman of the Joint Chiefs of Staff).

^cThe foreword of the strategy states that the SDO, in partnership with the CIO, will oversee strategy implementation. However, the strategy later states the SDO will oversee strategy implementation only until this responsibility transitions to a permanent governing entity, but does not identify who this permanent governing entity will be.

^dDOD Directive 3610.01, Electromagnetic Spectrum Enterprise Policy (Sept. 4, 2020) assigns responsibilities for enabling spectrum superiority. However, this directive does not identify an official responsible for strategy implementation.

Similar governance issues limited DOD’s progress on previous efforts. For example, the Chief Information Officer staff said officials involved with implementing the 2013 strategy did not have the seniority to compel other components to act, and DOD provided only temporary resources. Similarly, the Electronic Warfare Executive Committee that was responsible for implementing the 2017 strategy had portfolio constraints that limited their ability to do so. We also found that the Chief Information Officer does not have the ability to influence the services’ budgets or compel them to take action for electromagnetic warfare or other acquisition programs.

This challenge is not unique to the spectrum, especially within DOD's information environment, but we have an example of when DOD has successfully taken a different approach to leadership. For example, when it issued the 2018 DOD Cyber Strategy, DOD clearly assigned long-term leadership responsibilities and associated authority. According to officials from the Office of the Principal Cyber Advisor, DOD made the Principal Cyber Advisor responsible for and accountable to the Secretary of Defense for ensuring the strategy's implementation. Also, the Principal Cyber Advisor was established as an enduring position, so the official and their office were in a position to oversee implementation and transitions across cyber strategies. The officials said this consistency enabled DOD to more effectively achieve the goals identified in the cyber strategy. Congress took similar action in the National Defense Authorization Act for Fiscal Year 2020, mandating that the Secretary of Defense designate a Principal Information Operations Advisor.²⁴

As a result, we recommended the assignment of clear responsibility with the necessary authority and resources for implementing the 2020 strategy. DOD agreed with the intent of our recommendation, and in early March 2021 a DOD official told us that the department planned to address this issue in the strategy's implementation plan.

Issue an implementation plan and create associated oversight activities. We found that gaps in DOD's oversight processes for the previous strategies meant that it was at risk of not implementing the 2020 strategy. Oversight processes include elements such as descriptions of how objectives are to be achieved and by when (e.g., in an implementation plan), performance metrics, and regular process reviews.

Specifically, we found that DOD did not issue implementation plans in a timely manner for the previous spectrum-related strategies. Further, we found that as of December 2020, DOD had not taken actions that would be needed to fulfill an implementation plan and support meeting the strategy's objectives. In particular, DOD had not decided which senior officials would be accountable for taking action and providing progress reports.

These gaps are similar to our findings in previous work on DOD information operations. In 2019, we reported that DOD made limited

²⁴Pub. L. No. 116-92, § 1631(a)(1) (2019).

progress implementing its 2016 strategy for operations in the information environment in part because it lacked oversight processes.²⁵ In that report, we recommended that DOD establish a process to facilitate implementation for a revised strategy. We made similar recommendations in our recent spectrum review that DOD ensure it issues an implementation plan and also create an oversight process to facilitate the implementation. DOD agreed with the intent of the recommendations, but stated that it also needed to decide who would be responsible for long-term implementation. In early March 2021, an official told us this would be part of the finalization of the implementation plan. As previously discussed, senior DOD officials were reviewing the draft implementation plan at that time and DOD did not have a timeframe for when the department would publish the plan.

On April 1, 2021, DOD will reach the 180-day timeframe established in the strategy for issuing an implementation plan. We believe that DOD will continue to encounter similar challenges as with the previous strategies unless it takes specific actions, as we recommended in December 2020, to overcome the bureaucratic and structural roadblocks that exist within such a large and complex department. For example, an implementation plan will help ensure that DOD facilitates action related to the strategy. Further, developing oversight processes to facilitate strategy implementation would better position DOD to make measurable progress, fully implement the 2020 strategy, and achieve the department's future spectrum superiority goals.

In conclusion, DOD's response to our December report shows that officials are aware of the challenges and opportunities affecting military use of the spectrum. Ultimately, by addressing the gaps and challenges noted in our report, DOD would improve its ability to manage the use of the spectrum in military operations, and influence and interrupt the ability of our adversaries to use the spectrum when we need to. DOD has opportunities for further improvements to protect all of our systems—weapon systems, communication systems, computer systems, networks, and all other capabilities that are vital to military operations in the Information Age. This is especially critical as the department pursues spectrum superiority given that our adversaries have made great strides during the last two decades and will likely continue to do so. I look

²⁵GAO, *Information Operations: DOD Should Improve Leadership and Integration Efforts*, GAO-20-51SU, (Washington, D.C.: Oct. 18, 2019).

forward to continuing to work with you and the department to help it address spectrum challenges and to make the most of its opportunities.

Chairman Langevin, Ranking Member Stefanik, and Members of the Subcommittee, this completes my prepared statement. I would be pleased to respond to any questions you may have at this time.

GAO Contact and Staff Acknowledgments

If you or your staff members have any questions about this testimony, please contact Joseph W. Kirschbaum, Director, Defense Capabilities and Management, at (202) 512-9971 or Kirschbaumj@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. GAO staff who made key contributions to this testimony are Tommy Baril (Assistant Director), Jennifer Spence (Analyst-in-Charge), Haley Dunn, Matthew Jacobs, and Gabrielle Matuzsan. Other contributors to the testimony include Nicolaas Cornelisse (Assistant Director), Kasea Hamar (Assistant Director), Usman Ahmad, Tracy Barnes, Yecenia Camarillo, Adrienne Cline, Carolyn Demaree, David Jones, Richard Powelson, Terry Richardson, Pamela Snedden, Jordan Tibbetts, Hai Tran, and Yee Wong.

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